

REMARKS

This paper is being submitted in response to the official action dated June 20, 2005, wherein: (1) the drawings were objected to under 37 C.F.R. §1.121(d); (2) the specification was objected to under 35 U.S.C. §112, ¶1; (3) all pending claims 1-12 were rejected under 35 U.S.C. §112, ¶2; and, (4) all pending claims 1-12 were rejected under 35 U.S.C. §103(a) as being obvious over Yang U.S. Patent 5,422,286 (“Yang”) in view of Cerny et al. U.S. Patent 6,020,226 (“Cerny”) and Lu U.S. Patent 5,814,552 (“Lu”). Reconsideration and withdrawal of the objections and rejections are respectfully requested.

This response is timely filed, as it is accompanied by a petition for an extension of time to file in the first month and payment of the requisite extension fee.

I. Summary of Amendments to the Specification

The specification was objected to under 35 U.S.C. §112, ¶1, for a failure to be written in “full, clear, concise, and exact terms.” By the foregoing amendments, the “Detailed Description of the Preferred Embodiment” has been revised to improve clarity as well as the grammar of the filed English-language translation of the Korean-language priority application. No new matter has been added by these amendments. In view of the foregoing, reconsideration and withdrawal of the objection are respectfully requested.

II. Summary of the Amendments to the Drawings

The drawings were objected to under 37 CFR 1.121(d) because the figures contain hand-drawn figures and label. Appended hereto are replacement sheets for all figures. Where appropriate, labels have been removed and replaced with identifying numbers. No amendments have been made to the figures. In view of the foregoing, reconsideration and withdrawal of the objection are respectfully requested.

III. Summary of the Amendments to the Claims

Claims 1-12 have been amended. The amendments are generally directed to remedying the original translation into English, including the removal of narrative and indefinite language while adding language when necessary to provide proper antecedent

basis. No new matter has been introduced by the foregoing amendments. Specific amendments to the claims are as follows.

In claim 1, “for forming an align key” and “whose formation is already finished by removing the oxide film” have been removed as unnecessary narrative. Further in claim 1, “by using” has been replaced with “with” and “from” has been relocated to improve grammar.

The final recited step in claim 1 has been further amended to provide proper antecedent basis for claim 1 itself as well as later dependent claims. Specifically, “silicon etching method” has been replaced with “semiconductor substrate etching step,” “N-well process” has been replaced with “N-well ion implantation step,” and “P-well mask” has been replaced with “P-well ion implantation mask.” Additionally, the prepositional phrase “upon a N-well process” has been replaced with “after the N-well ion implantation step” to recite the proper timing relationship between the claim elements, as supported in the original specification at page 7.

The added “wherein” clause at the end of claim 1 recites that “the area key surface and the first alignment key surface are distinctly segregated by intervening portions of the oxide layer.” This structural characteristic is supported in the original specification at page 7 where it is noted that the first align key is bounded by “a step portion of the oxide film” and further supported by Fig. 3a.

In claim 2, “silicon” and “silicon etching step” have been replaced with “semiconductor substrate” and “semiconductor substrate etching step,” respectively, to provide proper antecedent basis with respect to claim 1

In claim 3, “upon the N-well formation process” has been deleted to remove an unnecessary narrative.

In claims 4 and 5, “the photoresist used as” has been removed as it is redundant with implantation masks already recited in each claim.

In claim 6, unnecessary narrative has been deleted and the remaining claim simply further defines the structure of the first align key. Specifically, the fact that “the first align key is bounded by a step portion of the oxide film” is recited and this is supported by the original specification at page 7 and in Fig. 2d.

In claim 7, unnecessary narrative has been deleted. Furthermore, the phrase “forward directional shape” has been simply replaced by “width” to denote the relevant dimension of the area key, as best understood according to Fig. 3a.

The original language of claim 8 has been replaced with a clearer statement of the intended recitation as opposed to the original translated form. Specifically, the claim adds to claim 1 the step of “aligning the semiconductor substrate using the first align key before forming the second align key,” which is supported on page 7 of the original specification. (“[A]s shown in Fig 2e, after the N-well photo process, a P-well photo process is conducted. At this time, wafer alignment for the photo process is performed by using a first align key.”)

In claim 9, “to be formed on the scribe lane region” and “which the oxide film is removed” have been removed as unnecessary narrative. Moreover, “upon the P-well photo process” has been deleted and replaced with “during the semiconductor substrate etching step.”

The original language of claim 10 has been replaced for consistency with respect to claim 1 as well as to provide a clearer statement of the intended recitation as opposed to the original translated form. Moreover, the claim adds to claim 1’s semiconductor substrate etching step the “the simultaneous etching of the oxide film in the P-well ion implantation region with the selective etching of the semiconductor substrate,” which is supported on pages 7 and 8 of the original specification. Specifically, because the oxide layer is etched at the same time that the silicon substrate is etched, the specification concludes that “therefore, it is possible to make a second align key 220 ... without any additional process.”

Claim 11 has been amended to remove unnecessary narrative as well as to provide a clearer statement of the intended recitation as opposed to the original translated form.

In claim 12, unnecessary narrative has been deleted.

IV. The 35 U.S.C. § 112, ¶2, Rejection is Traversed

Claims 1-12 have been rejected under rejected under 35 U.S.C. §112, ¶2, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. *See* the action at pp. 3 and 4.

As detailed above, claims 1-12 have been amended, primarily to address their narrative character, to improve their clarity, and to provide clear antecedent basis for claim

elements. With respect to the specific items addressed in the action, claims 6-8 no longer have any reference to either “a selective etching process” or “an N-well photo process.” Similarly, “forward directional shape” has been removed from claim 7. Reference to “a silicon etching method” in claims 1 and 11 has been replaced with “semiconductor substrate etching step.” Finally, in claim 12, the indefinite language “such as” has been removed.

In view of the foregoing, as well as the amendments presented in Section I of this paper, reconsideration and withdrawal of the 35 U.S.C. §112, ¶2, rejection are respectfully requested.

V. The 35 U.S.C. § 103(a) Rejection is Traversed

Claims 1-12 have been rejected under 35 U.S.C. §103(a) as being obvious over Yang in view of Cerny and Lu. *See* the action at pp. 4-6. A response to the obviousness rejection is set forth below.

A. Proper Basis for a § 103(a) Rejection

The PTO “has the burden under § 103 to establish a prima facie case of obviousness.” *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988). To establish a prima facie case of obviousness, the PTO must satisfy three basic criteria. First, the PTO must show that the combined disclosure of the prior art references teaches or suggests all of the claim limitations. *See* MPEP § 2143 (8th ed., May 2004). Moreover, it is “incumbent upon the examiner to identify wherein each and every facet of the claimed invention is disclosed in the applied reference.” *Ex parte Levy*, 17 USPQ2d 1461, 1462 (Bd. Pat. App. & Inter. 1990).

Second, where obviousness is alleged to arise from a combination of elements across a plurality of references, the PTO must show the existence of some suggestion, motivation, or teaching to those skilled in the art to make the precise combination recited in the claims. *See Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1320 (Fed. Cir. 2004). Compliance with this requirement prevents the PTO’s use of “the inventor’s disclosure as a blueprint for piecing together the prior art to defeat patentability — the essence of hindsight.” *Ecolochem, Inc. v. Southern Cal. Edison Co.*, 227 F.3d 1361, 1371-72 (Fed. Cir. 2000) (quoting *In re Dembicza*k, 175 F.3d 994, 999 (Fed. Cir. 1999)). Evidence of a suggestion or motivation to combine prior art references may come from “the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved.” *Brown & Williamson Tobacco Corp. v. Philip Morris*

Inc., 229 F.3d 1120, 1125 (Fed. Cir. 2000). The PTO's showing "must be clear and particular, and broad conclusory statements about the teaching of multiple references, standing alone, are not 'evidence.'" *Id.* (quoting *In re Dembicza*k, 175 F.3d at 1000). Indeed, the U.S. Court of Appeals for the Federal Circuit has consistently held that a person having ordinary skill in the art must not only have had some motivation to combine the prior art teachings, but also some motivation to combine the prior art teachings in the particular manner claimed. *See, e.g., In re Kotzab*, 217 F.3d 1365, 1371 (Fed. Cir. 2000) ("Particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed.").

To support a conclusion that a claimed combination is *prima facie* obvious, either (a) the references must expressly or impliedly suggest the claimed combination to one of ordinary skill in the art, or (b) the PTO must present a convincing line of reasoning as to why a person of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *See Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985); *see also, In re Rinehart*, 531 F.2d 1048, 1051 (CCPA 1976). The mere fact that the prior art could be modified as proposed by the PTO is not sufficient to establish a *prima facie* case of obviousness. *See In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992). The PTO must explain why the prior art would have suggested to one of ordinary skill in the art the desirability of the modification. *Id.; In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998) ("In other words, the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed.").

Finally, the PTO must demonstrate that a person having ordinary skill in the art would have a reasonable expectation of success when combining the disclosures of the references. The suggestion or motivation to make the claimed invention and the reasonable expectation of success must both be found in the prior art, and must not be derived by hindsight from knowledge of the application's disclosure. *In re Dow Chem. Co.*, 837 F.2d 469, 473 (Fed. Cir. 1988); MPEP § 2143.

B. No Prima Facie Case of Obviousness Has Been Made and, therefore, the § 103(a) Rejections are Traversed

The Yang, Cerny, and Lu patents *do not* teach or suggest all of the limitations recited in claims 1-12. Thus, no prima facie case of obviousness has been made in the instant action, and none exits based on the combination of the applied publications.

Independent claim 1 recites a method of aligning a key in a semiconductor device that includes the steps of: (1) dividing a semiconductor substrate into a scribe lane region and a main chip region; (2) depositing an oxide film on the semiconductor substrate; (3) forming an area key and a first align key at the same time on the scribe lane region by selectively etching the oxide film with a N-well ion implantation mask; (4) performing a N-well ion implantation on the region from which the oxide film is removed; and, (5) forming a second align key in the area key after the N-well ion implantation step-by using a semiconductor substrate etching step, wherein the semiconductor substrate etching step comprises the selective etching of the semiconductor substrate using a P-well ion implantation mask and a P-well ion implantation in a P-well ion implantation region, wherein the area key surface and the first alignment key surface are distinctly segregated by intervening portions of the oxide layer.

Yang is directed to a process for fabricating a high-voltage semiconductor power device. The action asserts that Yang discloses forming an area key and a first align key at the same time on the scribe lane region by selectively etching the oxide film with an N-well ion implantation mask, as recited in element (3) of claim 1, above. However, to accept this assertion would require that both the analogous area key and the analogous first align key be contiguous subregions of the base of a single groove 44. *See* Yang at col. 3, lines 52-54 and Fig. 7. This contiguous arrangement of the two subregions is required if the second align key recited in element (5) of claim 1 is to be considered analogous to the second set of grooves 52, as asserted in the Action at page 4. This arrangement is required because all of the claims recite that the second align key be formed by further etching in the area key, and thus Yang's disclosure of an "area key" must be interpreted as the outer surface of the base of groove 44 (below which the second set of grooves will be etched; *see* Yang at Figs. 7 and 11), and a disclosure of a "first align key" must be interpreted as the inner surface of the base of groove 44 (above which N⁺ doping region 46 and the thicker pad oxide layer 48' will be formed; *see* Yang at Figs 7 and 11).

Given this characterization of Yang, Yang still fails to disclose the geometric relation between the area key and first align key as recited in claim 1. Specifically, Yang's two

subsurfaces defined by the base of groove 44 are contiguous and, thus, are not “distinctly segregated by intervening portions of the oxide layer.” Moreover, at no point during the process disclosed by Yang are the two subsurfaces segregated by an oxide layer. Even when Yang’s process applies pad oxide layer 48, this oxide layer merely covers, but does not segregate, the would-be area key and first align key analogs.

Cerny is directed to a single integrated metal process for an enhancement mode field-effect transistor. Lu is directed to a high step process for manufacturing alignment marks for twin-well integrated circuit devices. Neither of these patents discloses the deficiencies in Yang — e.g., the lack of disclosure or suggestion of the geometric relation between the area key and first align key.

Specifically, while Cerny discloses a silicon etching step to create alignment marks 226 and 228, it does not disclose a structure analogous to a first align key or to an area key. *See* Cerny at col. 13, lines 42-43 and Fig 2G. The silicon nitride mask element 230 and the area around silicon nitride mask element 233 (which will be above alignment marks 226 and 228), even if taken to be analogous to a first align key and an area key, are not formed by etching an oxide film as recited in element (3) of claim 1.

Similarly, while Lu discloses alternating N- and P-well implantations, it discloses only one distinct alignment structure: the nitride alignment pattern 5A. *See* Lu at col. 3, lines 7-8 and Figs. 5-8. Moreover, Lu does not disclose any substrate etching process, which would be required to disclose any structure analogous to the second align key of claim 1. Notably, even though Lu discloses recessed portions 99 in the substrate 1, those portions are not formed by direct etching of the substrate. *See* Lu at col. 3, lines 52-53 and Fig. 8. Rather, the recessed portions 99 are formed by directionally-growing oxide layers 21B in a manner that consumes some of the substrate so that, when the oxide layers 21B are removed, a recession remains. *Id.* at col. 3, lines 38-42 and Fig. 7.

Thus, even when taken together, the combination of Yang, Cerny, and Lu fails to teach or suggest all of the elements recited by claim 1.

Dependent claim 3 recites that the oxide film is deposited at a thickness of 800Å to 1500Å. The action asserts that Yang “teaches an oxide film with a thickness of 800 to 2000Å [column 4, line 2].” *See* the action at p. 5. However, this citation refers to Yang’s disclosure of a *second* pad oxide layer 48. *See* Yang at col. 4, line 2 and Fig. 9. This is a different structural element from that which is cited in the action as corresponding to claim 1’s recited “oxide layer”

— mask layer 43. *See* the action at p. 4. Thus, the recited thickness of pad oxide layer 48 does not correspond to any structure recited in the claims. Moreover, Yang discloses no thickness in connection with mask layer 43. Therefore, the additional element recited in claim 3 also is not taught by the cited publications.

Dependent claim 11 recites a depth of the second align key of 800Å to 1500Å. The action asserts that Yang teaches “etching a second pattern with a depth of 1000 Å [column 4, lines 34-45].” *See* the action at p. 6. However, Yang does not disclose this length. If Yang’s grooves 52 are taken to be analogous to the recited second align key, then the relevant distance for comparison is the depth 55 of the grooves 52, less the depth 45 of the grooves 44. *See* Yang at Figs. 7 and 11. Yang discloses that depth 45 is 5-20% of the thickness 15 of the N⁺ layer 14. *See* Yang at col. 3, lines 54-56. Yang also discloses that depth 55 is 50-70% of the thickness 15 of the N⁺ layer 14. *Id.* at col. 3, lines 38-42. The disclosed thickness 15 is 20-100 µm. *Id.* at col. 3, lines 46-48. Thus, the minimum relevant distance for comparison is 30% (the minimum for depth 55 less the maximum for depth 45) of 20 µm (the minimum for thickness 15), which is 6 µm (\equiv 6000Å). Therefore, the additional element recited in claim 11 also is not taught by the cited publications.

Dependent claim 12 recites that the second align key has the same shape as the first align key. The action asserts that Yang teaches “a second alignment key with the same shape as the first alignment key [Figure 11].” *See* the action at p. 6. However, for the same reasons discussed with reference to claim 1, Yang’s disclosure of an “area key” must be interpreted as the outer surface of the base of groove 44 (below which the second set of grooves will be etched; *see* Yang at Figs. 7 and 11), and a disclosure of a “first align key” must be interpreted as the inner surface of the base of groove 44 (above which N⁺ doping region 46 and the thicker pad oxide layer 48’ will be formed; *see* Yang at Figs 7 and 11). These two structures do not have the same shape. *See* Yang at Fig. 11. Therefore, the additional element recited in claim 12 is not taught by the cited publication.

Because the applied patents when taken together do not even disclose all of the features recited in independent claim 1, they cannot possibly disclose all of the features recited in any of the dependent claims (e.g., dependent claims 2-12). Absent a disclosure of all of the features recited in the pending claims, the applied patents do not render the claims *prima facie* obvious. Consequently, the § 103(a) rejections of claims 1-12 are traversed, and reconsideration and withdrawal of the § 103(a) rejections are respectfully requested.

Prima facie obviousness under §103 is a legal conclusion — not a fact. *In re Rinehart*, 531 F.2d at 1052. The foregoing response identifies facts (e.g., evidence in the form of statements/deficiencies in the applied prior art) rebutting the alleged legal conclusion that the claimed invention is prima facie obvious. All of these facts must be evaluated along with the facts on which the legal conclusion was originally reached — not the legal conclusion itself. Having requested herein reconsideration of the legal conclusion set forth in the official action, the PTO is obligated to address all of the evidence and base its forthcoming legal conclusion(s) on such evidence, uninfluenced by its earlier conclusions.

Id.

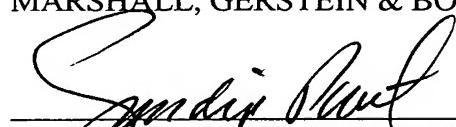
VI. Conclusion

For the foregoing reasons, it is submitted that all pending claims 1-12 are allowable over the cited references, and an indication to that effect is solicited.

Should the examiner wish to discuss the foregoing or any matter of form in an effort to advance this application toward allowance, he is urged to telephone the undersigned attorney at the indicated number.

Respectfully submitted,

MARSHALL, GERSTEIN & BORUN LLP



Sandip H. Patel (Reg. No. 43,848)
Attorneys for Applicant
6300 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606-6357
(312) 474-6300 (Telephone)

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